

Claims

1. A machine for lifting and handling loads with an orientable articulated placing jib, comprising a mast with a rotating pivot, an articulated jib (10) comprising a jib foot (19), articulated at its first end on the top of the mast by means of a horizontal rotation shaft (27), a jib head member (18) articulated for rotation by means of a horizontal articulation shaft (32) on the second end of the jib foot, a jib holding assembly comprising at least one stanchion (7), a jib holding line (11) and a moving counterweight (100) connected to the jib by the said retaining line, characterised in that the counterweight (100) is made to follow a guiding track (1) with a variable slope (α), integral with the rotating pivot, supporting the said counterweight, arranged opposite the jib, and where the variations in slope (α) are chosen so that the counterweight exerts a set of variable forces on the said jib and on the structure of the said machine, contributing to balancing the machine during movements of deployment/retraction of the jib in articulated working mode.

2. A lifting machine according to claim 1, characterised in that the guiding track (1) has, in its portion (A) closest to the mast, a slope (α_A) less than the slope (α_B) in at least a portion (B) further away from the mast.

3. A lifting machine according to one of claims 1 or 2, characterised in that the guiding track (1) has a curvilinear profile.

4. A lifting machine according to one of claims 1 or 2, characterised in that the guiding track (1) has a sigmoidal profile.

5. A lifting machine according to one of the preceding claims, characterised in that the guiding track (1) consists of a pair of parallel curvilinear rails (2, 3), and in that the counterweight comprises a moving crab (101) comprising running means (105) running on the said rails and ballast elements (110) carried by the said crab.

6. A lifting machine according to claim 5, characterised in that the crab (101) comprises a chassis (102, 103, 104) and, on each of the lateral sides of the chassis, support elements (108, 109) for receiving and carrying the said ballast elements (110) on each side of the rails so that the level of the centre of gravity of the counterweight is close to the level of the guiding track.

7. A lifting machine according to one of claims 5 or 6, characterised in that the said support elements (108, 109) are pairs of arms arranged in an inclined position, in that the said ballast elements (110) consist of sheets each having holes (111) with a surface area greater than the cross section of the support arms (108, 109) and configured so that the ballast sheets suspended from a pair of associated support arms is held in an immobile position with respect to the said crab (101) whatever the position of the crab on the guiding track (1) and parallel to the said guiding track (1).

8. A lifting machine according to claim 7, characterised in that the said support arms are foldable.

9. A lifting machine according to any one of the preceding claims, characterised in that it comprises a jib raising device (14, 15, 17) making the machine capable of working in articulated mode and in luffing mode, in that the jib head member comprises, on each side of its articulation axis (32) on the jib foot, respectively a jib head member tip

(22) and a counter jib head member (20), the said second end of the jib foot and the counter jib head member having conjugate shapes enabling the jib head member tip to come into a position aligned with the jib foot in the luffing working position and in that the variations in slope of the guiding track (1) are chosen so that the variable traction on the jib assist the luffing device and/or the changes in conformation of the jib associated with a change in working mode.

10. A lifting machine according to any one of the preceding claims, characterised in that the end of the said jib holding line (11) is fixed to the jib head member.

11. A lifting machine according to claim 10, characterised in that the point of attachment (12) of the end of the jib holding line (11) is arranged between the jib head member tip (22) and the counter jib head member (20).

12. A lifting machine according to claim 11, characterised in that the said attachment point (12) is arranged at a distance from the articulation (32) between jib foot and jib head member so as to describe an arc of a circle about the articulation axis (32), and in that the said jib holding line (11) crosses the jib foot / jib head member articulation axis (32) during the deployment of the jib in articulated working mode between the minimum reach position and the maximum reach position.

13. A lifting machine according to one of the preceding claims, characterised in that the rotation of the jib head member (18) about the jib foot / jib head member articulation (32) is controlled by means of a system of opposing cables (23, 24).

14. A lifting machine according to claim 13, characterised in that the first cable (23) is fixed to the end of the counter jib head member (20) and that the second cable (24) is fixed to the tip of the jib head member, at approximately the same distance from the articulation (32) as the distance from the point of attachment of the cable (23) with respect to the articulation (32).

15. A lifting machine according to claim 13 or 14, characterised in that the said system of opposing cables (23, 24) comprises electric winches (25, 26) and return pulleys (29) housed in the jib foot (19).

16. A lifting machine according to claim 15, characterised in that the electric winches (25, 26) are housed close to the first end of the jib foot (19) and the return pulleys (29) close to the second end of the jib foot (19).

17. A lifting machine according to one of the claims 1 to 12, characterised in that the rotation of the jib head member (205) about the end of the jib foot (204) is effected by means of a gear system (200) comprising an electric motor (201), a pinion (202) and a toothed segment (203).

18. A lifting machine according to claim 17, characterised in that the said electric motor (201) is fixed to the jib foot (204) and drives, via the said pinion (202), a circular toothed segment (203) fixed to the jib head member (205).